

AMENDMENTS TO THE CLAIMS

Claim 1. (original) A purified and isolated catalytic domain from a $\beta(1,4)$ -galactosyltransferase I that catalyzes formation of galactose- $\beta(1,4)$ -N-acetylglucosamine bond in the presence of magnesium.

Claim 2. (original) The catalytic domain according to claim 1, wherein the rate of formation of the galactose- $\beta(1,4)$ -N-acetylglucosamine bond is at least two-fold, five-fold, ten-fold, or one hundred-fold greater than wild-type $\beta(1,4)$ -galactosyltransferase I in the presence of magnesium.

Claim 3. (original) The catalytic domain according to claim 1, wherein the catalytic domain has a conservative amino acid exchange at an amino acid position corresponding to amino acid position 344 of SEQ ID NO: 6.

Claim 4. (original) The catalytic domain according to claim 3, wherein histidine is exchanged for methionine at an amino acid position corresponding to amino acid position 344 of SEQ ID NO: 6.

Claim 5. (original) The catalytic domain according to claim 1, further comprising a conservative amino acid substitution at an amino acid position corresponding to amino acid position 342 of SEQ ID NO: 6.

Claim 6. (original) The catalytic domain according to claim 5, wherein threonine is exchanged for cysteine at amino acid position 342.

Claim 7. (original) A polypeptide comprising the catalytic domain according to claim 1.

Claim 8. (original) A purified and isolated catalytic domain from a $\beta(1,4)$ -galactosyltransferase I that catalyzes formation of glucose- $\beta(1,4)$ -N-acetylglucosamine bond in the presence of magnesium.

Claim 9. (original) The catalytic domain according to claim 8, wherein the rate of formation of the glucose- $\beta(1,4)$ -N-acetylglucosamine bond is at least two-fold, five-fold, ten-fold, or one hundred-fold greater than wild-type $\beta(1,4)$ -N-galactosyltransferase I in the presence of magnesium.

Claim 10. (original) The catalytic domain according to claim 8, wherein

- (a) the catalytic domain has conservative amino acid exchanges at amino acid positions corresponding to amino acid positions 344 and 228 of SEQ ID NO : 6;
- (b) the catalytic domain has conservative amino acid exchanges at amino acid positions corresponding to amino acid positions 344 and 229 of SEQ ID NO: 6; or
- (c) the catalytic domain has conservative amino acid exchanges at amino acid positions corresponding to amino acid positions 344,228, and 229 of SEQ ID NO: 6.

Claim 11. (original) The catalytic domain according to claim 10, wherein histidine is exchanged for methionine at amino acid position 344, and

- (a) lysine is exchanged for arginine at amino acid position 228,
- (b) glycine is exchanged for alanine at amino acid position 229, or
- (c) lysine is exchanged for arginine at amino acid position 228, and glycine is exchanged for alanine at amino acid position 229.

Claim 12. (original) The catalytic domain according to claim 8, further comprising a conservative amino acid substitution at an amino acid corresponding to amino acid position 342 of SEQ ID NO: 6.

Claim 13-14. (cancelled)

Claim 15. (original) A purified and isolated catalytic domain from a $\beta(1,4)$ -galactosyltransferase I that catalyzes formation of an N-acetylgalactosamine- $\beta(1,4)$ -N-acetylglucosamine bond in the presence of magnesium.

Claims 16-21. (cancelled)

Claim 22. (previously presented) A purified and isolated catalytic domain from $\beta(1,4)$ -galactosyltransferase I of claim 15 wherein the domain catalyzes formation of an N-acetylgalactosamine- $\beta(1,4)$ -glucose bond in the presence of α -lactalbumin and magnesium.

Claims 23-27. (cancelled)

Claim 28. (original) A polypeptide comprising the catalytic domain according to claim 22.

Claims 29-47. (cancelled)

Claim 48. (original) A polypeptide comprising the catalytic domain according to claim 43.

Claim 49. (previously presented) A nucleic acid segment encoding a catalytic domain according to claim 1.

Claim 50. (original) An expression cassette comprising the nucleic acid segment according to claim 49.

Claim 51. (previously presented) A cell comprising the nucleic acid segment according to claim 49.

Claim 52. (original) A method to synthesize a galactose- $\beta(1,4)$ -N-acetylglucosamine moiety comprising incubating a reaction mixture comprising the catalytic domain according to claim 1, with a donor comprising galactose, and an acceptor comprising N-acetylglucosamine.

Claim 53. (cancelled)

Claim 54. (original) An oligosaccharide comprising a moiety synthesized according to the method of claim 52.

Claim 55. (original) A method to synthesize a $\beta(1,4)$ -N-acetylglucosamine moiety comprising:

incubating a reaction mixture comprising the catalytic domain according to claim 8, with a donor comprising glucose, and an acceptor comprising N-acetylglucosamine.

Claim 56. (original) The method according to claim 55, wherein the donor is UDP-glucose, the acceptor is N-acetylglucosamine, or the donor is UDP-glucose and the acceptor is N-acetylglucosamine.

Claim 57-95. (cancelled)